

## Hit List

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☐ 1. Document ID: US 5179074 A    Relevance Rank: 99

Using default format because multiple data bases are involved.

L1: Entry 16 of 21

File: USPT

Jan 12, 1993

US-PAT-NO: 5179074

DOCUMENT-IDENTIFIER: US 5179074 A

TITLE: Hybrid dielectric resonator/high temperature superconductor filter

DATE-ISSUED: January 12, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fiedziuszko; Slawomir J.	Palo Alto	CA		
Holme; Stephen C.	San Ramon	CA		

US-CL-CURRENT: 505/210; 333/202, 333/219.1, 333/99S, 505/700, 505/866

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWC	Draw.Ds
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☐ 2. Document ID: US 4918050 A    Relevance Rank: 95

L1: Entry 21 of 21

File: DWPI

Apr 17, 1990

DERWENT-ACC-NO: 1990-156088

DERWENT-WEEK: 199020

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TITLE: Superconducting resonator for electronic filter - has superconductors which exhibit inductance with low loss so propagated signal has velocity inversely proportional to dielectric thickness

INVENTOR: DWORSKY, L

PATENT-ASSIGNEE: MOTOROLA INC (MOTI)

PRIORITY-DATA: 1988US-0177296 (April 4, 1988)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
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US 4918050 A                      April 17, 1990                      000

## APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
US 4918050A	April 4, 1988	1988US-0177296	

INT-CL (IPC): H01P 1/20; H01P 7/08

ABSTRACTED-PUB-NO: US 4918050A

## BASIC-ABSTRACT:

The resonator which comprises a superconductor for conducting an electrical signal, a second superconductor for conducting an electrical signal and a dielectric insulator, for insulating the superconductors from each other. The superconductors are coupled to two surfaces of the dielectric, which defines a thickness between them which is less than or equal to five penetration depths of a signal carried in the superconductors. The superconductors each exhibit internal inductance with low loss so that an electrical signal propagated in the resonator has a velocity inversely proportional to the thickness of the dielectric.

The superconductor is a ceramic superconductor with a critical temp. well above 7 deg.K, most pref. above 77 deg.K. The dielectric material has a dielectric constant greater than that of free space and the insulator comprises two planar sheets arranged parallel to each other.

ADVANTAGE - Reduced size and weight.

ABSTRACTED-PUB-NO: US 4918050A

## EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.2A/5

DERWENT-CLASS: W02

EPI-CODES: W02-A03; W02-A05;

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KIND	Draw.D
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☐ 3. Document ID: US 4918050 A      Relevance Rank: 95

L1: Entry 19 of 21

File: USPT

Apr 17, 1990

US-PAT-NO: 4918050

DOCUMENT-IDENTIFIER: US 4918050 A

TITLE: Reduced size superconducting resonator including high temperature superconductor

DATE-ISSUED: April 17, 1990

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dworsky; Lawrence	Northbrook	IL		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Motorola, Inc.	Schaumburg	IL			02

APPL-NO: 07/177296 [PALM]

DATE FILED: April 4, 1988

INT-CL-ISSUED: [04] H01P 1/203, H01P 7/08

US-CL-ISSUED: 505/1; 505/701, 505/866, 333/995, 333/219, 333/204

US-CL-CURRENT: 505/210; 333/204, 333/219, 333/995, 505/701, 505/866

FIELD-OF-CLASSIFICATION-SEARCH: 333/219, 333/204, 333/995, 505/1, 505/866, 505/856, 505/700-704

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3857114</u>	December 1974	Minet et al.	333/204 X
<u>4523162</u>	June 1985	Johnson	333/202
<u>4609892</u>	September 1986	Higgins, Jr.	333/204
<u>4701727</u>	October 1987	Wong	333/204

## OTHER PUBLICATIONS

Vendik, O. G. et al., "Superconducting-Film Stripline Filter"; Soviet Tech. Phys. Letters; vol. 7 (6); Jun. 1981; pp. 316, 317.

DiNardo, A. J. et al.; "Superconducting Microstrip Hi-Q Microwave Resonators"; Journal of Applied Physics; vol. 42, No. 1; Jan. 1971; pp. 186-189.

Kwon, O. K. et al.; "Superconductors as Very High Speed System Level Interconnects"; IEEE Electron Devices Letter; vol. EDL-8, No. 12; Dec. 1987; pp. 582-585.

Henkels, W. H. et al.; "Penetration Depth Measurements on Type II Superconducting Films"; IEEE Transactions on Magnetics; vol. MAG-13, No. 1; Jan. 1977; pp. 63-66.

O. K. Kwon, B. W. Langley, R. F. W. Pease, and M. R. Beasley, "Superconductors as Very High Speed System-Level Interconnects", Semiconductor Research Corporation, private communication, Sep. 15, 1987, 15 pages.

Lexis/Nexis, Darrel Whitten of Prudential-Bache Securities, "International Symposium on Superconducting Materials", Mar. 21, 1987, one page.

Lexis/Nexis bis Informat Newsfile, "Japan-Toshiba Announces First Superconductive Wire", International Herald Tribune, Apr. 3, 1987, p. 17.

N. H. Meyers, "Inductance in Thin-Film Superconducting Structures", Proceedings of the IRE, Nov. 1961, pp. 1640-1649.

T. B. Gheewala, "Design of 2.5 um CIL Circuits", IBM J. Res. Develop., vol. 24, No. 2, Mar. 1980, pp. 132-133.

O. K. Kwon, S. Y. Chou, R. F. W. Pease, and B. A. Auld, "An Accurate Transmission Line Model of Superconducting Interconnects for Very High Speed System-Level Packaging", SRC #85-10-064, IEEE VLSI 7 GAAS Packaging Workshop, Sep. 1987, pp. 34-35.

S. Sridhar, "Microwave Technology and Materials Report", Microwave Journal, Jun. 1987, pp. 117-123.

J. C. Swihart, "Field Solution for a Thin-Film Superconducting Strip Transmission

Line", Journal of Applied Physics, vol. 32, #3, Mar. 1961, pp. 461-469.

ART-UNIT: 252

PRIMARY-EXAMINER: Laroche; Eugene R.

ASSISTANT-EXAMINER: Lee; Benny T.

ATTY-AGENT-FIRM: Krause; Joseph P. Parmelee; Steven G.

ABSTRACT:

An arrangement for a superconducting resonator suitable for use in electronic filters is disclosed, in which a resonator exhibits an increased amount of internal inductance without a lengthening of the resonator. By utilizing a relatively thin dielectric material, a significant amount of magnetic field is made to exist in a layer of the superconductors nearest to the dielectric. This magnetic field induces a non-negligible internal inductance within the layer. The net result of having this extra inductance is that the wave velocity is no longer a constant, independent of dielectric thickness. Thus the resonator can be constructed to be significantly shorter than the conventional wave velocity equation would imply. Hence, the present invention provides a reduction in the length as well as in the cross-sectional area of a resonator, which means that one or more of such resonators may then be advantageously utilized to achieve significantly reduced filter size.

17 Claims, 8 Drawing figures

Full	Title	Chabon	Front	Review	Classification	Date	Reference			Claims	Keywords	Drawings
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☐ 4. Document ID: US 5136268 A      Relevance Rank: 95

L1: Entry 18 of 21

File: USPT

Aug 4, 1992

US-PAT-NO: 5136268

DOCUMENT-IDENTIFIER: US 5136268 A

TITLE: Miniature dual mode planar filters

DATE-ISSUED: August 4, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fiedziuszko; Slawomir J.	Palo Alto	CA		
Curtis; John A.	Sunnyvale	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Space Systems/Loral, Inc.	Palo Alto	CA			02

APPL-NO: 07/688038      [PALM]

DATE FILED: April 19, 1991

INT-CL-ISSUED: [05] H01P 1/203, H01P 7/08

US-CL-ISSUED: 333/204; 333/219, 333/995, 505/866

US-CL-CURRENT: 333/204; 333/219, 333/995, 505/866

FIELD-OF-CLASSIFICATION-SEARCH: 333/202, 333/204, 333/205, 333/134, 333/219, 333/995, 333/219.1, 333/212, 505/866

See application file for complete search history.

PRIOR-ART-DISCLOSED:

#### U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3796970</u>	March 1974	Snell, Jr.	333/134
<u>4780691</u>	October 1988	Fiedziuszko	333/235 X
<u>4918050</u>	April 1990	Dworsky	333/219 X

#### FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0099002	June 1983	JP	333/204
1062809	December 1983	SU	333/219

#### OTHER PUBLICATIONS

J. A. Curtis and S. J. Fiedziuszko, "Miniature Dual Mode Microstrip Filters", Digest of the MTT symposium, Boston, Mass., Jun. 1991.

ART-UNIT: 252

PRIMARY-EXAMINER: LaRoche; Eugene R.

ASSISTANT-EXAMINER: Ham; Seung

ATTY-AGENT-FIRM: Ferrell; John S. Radlo; Edward J.

#### ABSTRACT:

A dual mode microstrip resonator (1) usable in the design of microwave communication filters. The substantially square resonator (1) provides paths for a pair of orthogonal signals which are coupled together using a perturbation located in at least one corner of the resonator (1). The perturbation can be introduced by notching (3) the resonator (1) or by adding a metallic or dielectric stub (5) to the resonator (1).

9 Claims, 8 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	DOC	Draw D.
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☐ 5. Document ID: US 5160906 A      Relevance Rank: 95

L1: Entry 17 of 21

File: USPT

Nov 3, 1992

US-PAT-NO: 5160906

DOCUMENT-IDENTIFIER: US 5160906 A

TITLE: Microstripe filter having edge flared structures

DATE-ISSUED: November 3, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Siomkos; John R.	Royal Palm Beach	FL		
Huang; Philip M.	Sunrise	IL		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Motorola, Inc.	Schaumburg	IL			02

APPL-NO: 07/720143      [PALM]

DATE FILED: June 24, 1991

INT-CL-ISSUED: [05] H01P 1/203, H01P 7/08

US-CL-ISSUED: 333/204; 333/219

US-CL-CURRENT: 333/204; 333/219

FIELD-OF-CLASSIFICATION-SEARCH: 333/202-205, 333/219, 333/238, 333/246

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3879690</u>	April 1975	Golant et al.	333/204
<u>3961296</u>	June 1976	Wiggenhorn	333/238
<u>4418324</u>	November 1983	Higgins	333/204
<u>4419289</u>	January 1984	Higgins, Jr. et al.	333/204
<u>4785271</u>	November 1988	Higgins, Jr.	333/204
<u>4918050</u>	April 1990	Dworsky	505/1
<u>4940955</u>	July 1990	Higgins, Jr.	333/219 X
<u>4967171</u>	October 1990	Ban et al.	333/204 X

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0161802	July 1986	JP	333/204
0158801	June 1989	JP	333/238

## OTHER PUBLICATIONS

"Microwave Filters, Impedance-Matching Networks, and Coupling Structures", Matthaei, et al., Copyright 1980. Reprint of Edition Published by McGraw-Hill Book Co., Inc. in 1964.

ART-UNIT: 252

PRIMARY-EXAMINER: LaRoche; Eugene R.

ASSISTANT-EXAMINER: Ham; Seung

ATTY-AGENT-FIRM: Agon; Juliana

## ABSTRACT:

A transmission line structure comprises a dielectric substrate (11) having first and second opposing sides separated by a first distance (3). A transmission line (13) is disposed on the first side while an opposed conductor (12) is disposed on the second side. The transmission line (13) has a first edge (4) a second edge (6), and a middle portion (8). Thicknesswise, the middle portion (8) is separated from the opposed conductor by the first distance (3), and at least a portion of the first edge (4) is separated from the opposed conductor by a second distance less than the first distance (3).

8 Claims, 6 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	DOC	Drawings
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☐ 6. Document ID: US 5215959 A      Relevance Rank: 95

L1: Entry 15 of 21

File: USPT

Jun 1, 1993

US-PAT-NO: 5215959

DOCUMENT-IDENTIFIER: US 5215959 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Devices comprised of discrete high-temperature superconductor chips disposed on a surface

DATE-ISSUED: June 1, 1993

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Van Duzer; Theodore	El Cerrito	CA		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
University of California, Berkeley	Oakland	CA			02

APPL-NO: 07/885926 [PALM]

DATE FILED: May 18, 1992

## PARENT-CASE:

This is continuation, of application Ser. No. 07/586,278 filed Sep. 21, 1990, now abandoned.

INT-CL-ISSUED: [05] H01P 7/06, H01Q 9/16, H01B 12/06

US-CL-ISSUED: 505/1; 505/700, 505/701, 505/866, 333/99S, 343/700R, 343/793

US-CL-CURRENT: 505/201; 333/99S, 343/700R, 343/793, 505/210, 505/700, 505/701, 505/866

FIELD-OF-CLASSIFICATION-SEARCH: 333/99S, 343/7R, 343/793, 343/741, 505/1, 505/700, 505/701, 505/866

See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3184674</u>	May 1965	Garwin	333/238 X
<u>3441881</u>	April 1969	Weissman	333/99S
<u>4765055</u>	August 1988	Ozaki et al.	29/599
<u>4837536</u>	June 1989	Honjo	333/247
<u>4885494</u>	December 1989	Higashi	310/211
<u>4918049</u>	April 1990	Cohn et al.	505/1
<u>4918050</u>	April 1990	Dworsky	505/1

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
44104	February 1989	JP	333/227
54740	March 1989	JP	505/703

## OTHER PUBLICATIONS

Walker, G. B. et al; "Superconducting Superdirectional Antenna Arrays"; IEEE Trans on Antennas & Propagation; vol. AP-25, No. 6; Nov. 1977; pp. 885-887.

Pavlyuk, V. A., et al; "Superconducting Antenna"; Sov Tech Phys Lett; vol. 4, No. 2; Feb. 1978; p. 80.

J. G. Bednorz et al., Z. Phys., B 64, 189 (1986), pp. 189-193.

M. K. Wu et al., Phys. Rev. Lett. 908 (1987), pp. 908-910.

"Superconductivity Starts to Go Commercial", Design News, May 8, 1989.

S. K. Khamas et al., "A High-Tc Superconducting Short Dipole Antenna", Electronics Letters, vol. 24, No. 8, 460-461 (1988).



Z. Wu et al., "Supercooled and Superconducting Small Loop Antenna", IEEE Colloquium on the Microwave Applications of High Temperature Superconductors, Oct. 24, 1989.  
T. S. M. MacLean et al., "High Temperature Superconducting Antennas", British Electromagnetic Measurements Conference, National Physical Laboratory, Nov. 7-9, 1989.  
ICI Advanced Materials, "ICI Advanced Materials and AT&T Bell Laboratories High-Temperature Superconductive Resonator", Nov. 3, 1989.  
ICI Advanced Materials, "ICI Develops First Superconducting Dipole Antenna", Sep. 26, 1988.  
C. E. Gough et al., "Critical Currents in a High-Tc Superconducting Short Dipole Antenna", ACS 1988, San Francisco, Calif.  
R. C. Hansen, "Superconducting Antennas", IEEE Transactions on Aerospace and Electronic Systems, vol. 26, No. 2, Mar. 1990.

ART-UNIT: 252

PRIMARY-EXAMINER: Pascal; Robert J.

ASSISTANT-EXAMINER: Lee; Benny T.

ATTY-AGENT-FIRM: Heller, Ehrman, White & McAuliffe

ABSTRACT:

A structure having a surface exposed to electromagnetic radiation in the microwave or millimeter-wave spectrum wherein discrete elements including a high-temperature superconducting film formed on a substrate are disposed on the surface.

23 Claims, 4 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWC	Drawings
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☐ 7. Document ID: US 5293140 A      Relevance Rank: 95

L1: Entry 14 of 21

File: USPT

Mar 8, 1994

US-PAT-NO: 5293140

DOCUMENT-IDENTIFIER: US 5293140 A

TITLE: Transmission line structure

DATE-ISSUED: March 8, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Higgins; Robert J.	Sunrise	FL		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Motorola, Inc.	Schaumburg	IL			02

APPL-NO: 07/908622 [PALM]  
DATE FILED: June 29, 1992

## PARENT-CASE:

This is a continuation of application Ser. No. 07/636,963, filed Jan. 2, 1991, and now abandoned.

INT-CL-ISSUED: [05] H01P 3/08

US-CL-ISSUED: 333/204; 333/219, 333/238, 333/246, 174/117F, 174/117FF  
US-CL-CURRENT: 333/204; 174/117F, 174/117FF, 333/219, 333/238, 333/246

FIELD-OF-CLASSIFICATION-SEARCH: 333/204, 333/219, 333/238, 333/246, 333/219.1, 174/117F, 174/117FF

See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3835420</u>	September 1974	Orime et al.	333/238
<u>3879690</u>	April 1975	Golant et al.	333/238
<u>4157517</u>	June 1979	Kneisel et al.	333/205
<u>4609892</u>	September 1986	Higgins, Jr.	333/204
<u>4785271</u>	November 1988	Higgins, Jr.	333/204
<u>4918050</u>	April 1990	Dworsky	333/204
<u>4940955</u>	July 1990	Higgins, Jr.	333/204
<u>4963843</u>	October 1990	Peckham	333/204
<u>4975664</u>	December 1990	Ito et al.	333/204
<u>5162761</u>	November 1992	Kita et al.	333/204

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0060303	February 1990	JP	333/219

ART-UNIT: 252

PRIMARY-EXAMINER: Pascal; Robert J.

ASSISTANT-EXAMINER: Shingleton; Michael B.

ATTY-AGENT-FIRM: Hernandez; Pedro P.

## ABSTRACT:

A microstrip or stripline structure (10) is disclosed. A dielectric substrate (11) of ceramic includes an area (14) having a different electromagnetic characteristic. The differing dielectric characteristic can be provided by an area (14) in the

substrate having a reduced thickness. A transmission line (13) is disposed on one side of the substrate and is partially disposed on the area of reduced thickness. An opposed conductor, such as a ground plane (12), is disposed on the opposite side of the substrate. For a microstrip (20), two such substrates are utilized.

6 Claims, 5 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	WAC	Drawings
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☐ 8. Document ID: US 5350639 A Relevance Rank: 95

L1: Entry 13 of 21

File: USPT

Sep 27, 1994

US-PAT-NO: 5350639

DOCUMENT-IDENTIFIER: US 5350639 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Dielectric ceramic for use in microwave device, a microwave dielectric ceramic resonator dielectric ceramics

DATE-ISSUED: September 27, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Inoue; Tatsuya	Osaka			JP
Kagata; Hiroshi	Osaka			JP
Kato; Junichi	Osaka			JP
Kameyama; Ichiro	Osaka			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Matsushita Electric Industrial Co., Ltd.	Osaka			JP		03

APPL-NO: 07/941961 [PALM]

DATE FILED: September 8, 1992.

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
JP	3-230158	September 10, 1991
JP	3-230419	September 10, 1991
JP	4-042877	February 28, 1992

INT-CL-ISSUED: [05] H01P 7/00

US-CL-ISSUED: 428/633; 428/632, 428/671, 501/134, 333/219.1

US-CL-CURRENT: 428/633; 333/219.1, 428/632, 428/671, 501/134

FIELD-OF-CLASSIFICATION-SEARCH: 501/134, 333/219.1, 428/632, 428/671, 428/633  
See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4687540</u>	August 1987	Singhdeo et al.	428/632
<u>4785271</u>	November 1988	Higgins, Jr.	333/219
<u>4785375</u>	November 1988	Campbell	252/62.3BT
<u>4918050</u>	April 1990	Dworsky	333/219
<u>4978881</u>	December 1990	Wakita et al.	310/328
<u>5004713</u>	April 1991	Bardhan et al.	501/135
<u>5028348</u>	July 1991	Konoike et al.	252/62.59
<u>5105176</u>	April 1992	Okamura et al.	333/219

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0190574	August 1986	EP	501/134
52-32600	March 1977	JP	
62-12002	January 1987	JP	
2-172106	July 1990	JP	
3-53407	March 1991	JP	
3-53408	March 1991	JP	

## OTHER PUBLICATIONS

Lanagan et al, "Microwave Dielectric Properties of Antiferroelectric Lead Zirconate" J. Am. Ceram. Soc., vol. 71 [4], pp. 311-316 (Apr. 1988).  
Lanagan et al, "Dielectric Behavior of the Relaxor Pb(Mg<sub>1/3</sub>Nb<sub>2/3</sub>)O<sub>3</sub> - PbTiO<sub>3</sub> Solid-Solution System in the Microwave Region", Communications of the American Ceramic Society vol. 72, No. 3, pp. 481-483, (Mar. 1989).

ART-UNIT: 113

PRIMARY-EXAMINER: Lewis; Michael

ASSISTANT-EXAMINER: Nguyen; N. M.

ATTY-AGENT-FIRM: Willian Brinks Hofer Gilson and Lione

## ABSTRACT:

Dielectric ceramics a microwave device made of (Bi<sub>0.2</sub>O<sub>0.3</sub>)<sub>1-x</sub>(Nb<sub>0.2</sub>O<sub>0.5</sub>)<sub>1-x</sub> includes at least one of subcomponents of CuO and V<sub>0.2</sub>O<sub>0.5</sub>, wherein the composition ratio x is fallen into a range of 0.48 to 0.51, an atomic ratio AR1 defined by the following equation:

AR1=(the number of Cu atoms of the CuO)/ARO,

where

ARO=(the number of Bi atoms of the (Bi.sub.2 O.sub.3).sub.x (Nb.sub.2 O.sub.5).sub.1-x)+(the number of Nb atoms of the (Bi.sub.2 O.sub.3).sub.x (Nb.sub.2 O.sub.5).sub.1-x)

is fallen into a range of  $0 < AR1 < 0.01$ , and another atomic ratio AR2 defined by the following equation:

$AR2 = (\text{the number of V atoms of the } V_{0.2}O_{0.5}) / ARO$

is fallen into a range of  $0 < AR2 \leq 0.02$ . Further, a microwave dielectric resonator includes a microstrip conductor formed between a plurality of first sheet-shaped dielectric layers and a plurality of second sheet-shaped dielectric layers, wherein the microstrip conductor is electrically connected to one external electrode and the dielectric layers are made of the above-mentioned dielectric ceramics. Furthermore, a process of making a microwave dielectric ceramics resonator includes a step of firing a resonator element in nitrogen atmosphere under a condition of an oxygen concentration equal to or less than 1000 ppm at a temperature in a range from 875.degree. to 1000 .degree. C.

12 Claims, 8 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	DOC	Discl
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☐ 9. Document ID: US 5408206 A      Relevance Rank: 95

L1: Entry 12 of 21

File: USPT

Apr 18, 1995

US-PAT-NO: 5408206

DOCUMENT-IDENTIFIER: US 5408206 A

TITLE: Resonator structure having a strip and groove serving as transmission line resonators

DATE-ISSUED: April 18, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Turunen; Aimo	Oulu			FI
Jantunen; Heli	Oulu			FI

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
LK-Products Oy	Kempele			FI	03

APPL-NO: 08/058525      [PALM]

DATE FILED: May 6, 1993

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
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FI

922102

May 8, 1992

INT-CL-ISSUED: [06] H01P 1/203, H01P 7/08

US-CL-ISSUED: 333/204; 333/219

US-CL-CURRENT: 333/204; 333/219

FIELD-OF-CLASSIFICATION-SEARCH: 333/202-205, 333/238, 333/246, 333/219

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4266206</u>	May 1981	Bedard et al.	333/204
<u>4609892</u>	September 1986	Higgins, Jr.	333/204
<u>4785271</u>	November 1988	Higgins, Jr.	333/204
<u>4800348</u>	January 1989	Rosar et al.	333/202
<u>4918050</u>	April 1990	Dworsky	333/204 X
<u>5160905</u>	November 1992	Hoang	333/204
<u>5331300</u>	July 1994	Shimizu et al.	333/204 X

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0364931	April 1990	EP	333/204
0466069A3	March 1992	EP	333/204
119901	July 1984	JP	333/246
0161802	July 1986	JP	333/203
0194702	August 1987	JP	333/204
0131601	June 1988	JP	
0190404	August 1988	JP	
0145202	June 1991	JP	
4312002	November 1992	JP	
2139427	November 1984	GB	
2184608	June 1987	GB	
2236432	April 1991	GB	

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Patent Abstract of Japan, vol. 11, No. 33 (E-476) (2480) Jan. 30, 1987, 1 page, JP-A-61 201 501.

T. Hasegawa et al., "Characteristics of Valley Microstrip Lines for Use in Multilayer MMIC's", IEEE Microwave And Guided Wave Letters, vol. 1, No. 10, Oct. 1991, New York U.S., pp. 275-277.

T. Nishikawa et al., "800 MHz band face-bonding filter using dielectric B.D.L.S.", 1986 IEEE-MTT-S International Microwave Symposium-Digest, Jun. 2-4, 1986, Baltimore, U.S., IEEE, New York, U.S., 1986, pp. 403-406.

ART-UNIT: 255

PRIMARY-EXAMINER: Ham; Seungsook

ATTY-AGENT-FIRM: Darby &amp; Darby

## ABSTRACT:

The present invention relates to a resonator structure composed of two dielectric pieces. On the upper surface of a first piece (1) is provided a groove (7) extending across the entire surface and coated with an electrically conductive agent, said coating being at least in one end connected with an electrically conductive coating serving as a ground plane, so that the groove (7) forms a transmission line resonator. On the upper surface of the second piece (2) is provided a conductive strip (9) running in the middle of the surface, said strip forming a transmission line resonator. The pieces (1,2) are placed with the upper surfaces thereof against each other and attached to each other so that the groove (7) and the strip (9) are against one another in parallel, whereby the groove and the strip together form a resonator.

16 Claims, 7 Drawing figures

Full	Title	Publication	Front	Review	Classification	Date	Reference	Claims	RMK	Drawings
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☐ 10. Document ID: US 5584067 A Relevance Rank: 95

L1: Entry 11 of 21

File: USPT

Dec 10, 1996

US-PAT-NO: 5584067

DOCUMENT-IDENTIFIER: US 5584067 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Dual traveling wave resonator filter and method

DATE-ISSUED: December 10, 1996

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
V. Buer; Kenneth	Chandler	AZ		
Agar, Jr.; Bill T.	Chandler	AZ		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Motorola, Inc.	Schaumburg	IL			02

APPL-NO: 08/520905 [PALM]

DATE FILED: August 30, 1995

## PARENT-CASE:

This application is a continuation of prior application Ser. No. 08/164,940, filed Dec. 10, 1993, abandoned.

INT-CL-ISSUED: [06] H04B 1/26

US-CL-ISSUED: 455/302; 455/304, 455/306, 455/327, 333/116, 333/204, 333/219

US-CL-CURRENT: 455/302; 333/116, 333/204, 333/219, 455/304, 455/306, 455/327

FIELD-OF-CLASSIFICATION-SEARCH: 455/302, 455/304, 455/305, 455/306, 455/325, 455/327, 455/338, 455/339, 455/340, 333/110, 333/116, 333/204, 333/219

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>2922123</u>	January 1960	Cohn	333/110
<u>3560887</u>	February 1971	Napoli et al.	333/110
<u>4249263</u>	February 1981	Shinkawa et al.	455/327
<u>4412351</u>	October 1983	Onishi et al.	455/327
<u>4691379</u>	September 1987	Shizume	455/327
<u>4706049</u>	November 1987	Dydyk	333/204
<u>4918050</u>	April 1990	Dworsky	333/204
<u>5020148</u>	May 1991	Bonato	333/116

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0010507	January 1982	JP	455/302
0176005	July 1988	JP	333/110

ART-UNIT: 261

PRIMARY-EXAMINER: Faile; Andrew

ATTY-AGENT-FIRM: Botsch, Sr.; Bradley J.

## ABSTRACT:

A dual traveling wave resonator filter includes a microstrip line to receive an input signal at a first end and first and second traveling wave resonator rings. Each traveling wave resonator ring is in close proximity to the microstrip line such that first and second resonant first combined signals are induced, respectively, in each of the first and second traveling wave resonator rings in response to the input signal on the microstrip line. A band-reject signal is rejected from the microstrip line and a pass-band signal is produced from the microstrip line at a second end.

14 Claims, 1 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	Draw	Draw



☐ 11. Document ID: US 5682128 A      Relevance Rank: 95

L1: Entry 10 of 21

File: USPT

Oct 28, 1997

US-PAT-NO: 5682128

DOCUMENT-IDENTIFIER: US 5682128 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Superconducting reentrant resonator

DATE-ISSUED: October 28, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Huang; Qiang	Sunnyvale	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Illinois Superconductor Corporation	Mt. Prospect	IL				02

APPL-NO: 08/636866      [PALM]

DATE FILED: April 23, 1996

INT-CL-ISSUED: [06] H01P 1/203

US-CL-ISSUED: 335/216

US-CL-CURRENT: 335/216

FIELD-OF-CLASSIFICATION-SEARCH: 335/216, 505/1, 505/701, 505/866, 505/700-704, 333/219, 333/204

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>2752494</u>	June 1956	Finke et al.	250/36
<u>3246266</u>	April 1966	Racy	333/83
<u>3760482</u>	September 1973	Kawamura	29/169.5
<u>3872413</u>	March 1975	Schneider	333/82B
<u>4207548</u>	June 1980	Graham et al.	333/225
<u>4918050</u>	April 1990	Dworsky	505/1
<u>4996188</u>	February 1991	Kommrusch	505/1
<u>5304968</u>	April 1994	Ohtonen et al.	333/222
<u>5409889</u>	April 1995	Das	505/210
<u>5434547</u>	July 1995	Kaida et al.	333/187

ART-UNIT: 211

PRIMARY-EXAMINER: Krishnan; Aditya

ATTY-AGENT-FIRM: Marshall, O'Toole, Gerstein, Murray &amp; Borun

## ABSTRACT:

A reentrant resonator has a center conductor fixed to an end wall and surrounded by side walls of a housing, where end walls, side walls, and center conductors are all coated with a high-temperature superconducting material. The end walls, side walls, and center conductors are shaped so as to merge smoothly between the side wall and end wall, and end wall and center conductor in order to avoid any corners or right angles. The absence of corners and right angles allows the surface of the coating of high-temperature superconducting material to avoid electromagnetic discontinuities. A cover for the resonator has a tuning device consisting of a bracket receiving a bolt. When the bolt is rotated, an end of the bolt engages the cover to force a surface of the cover closer to the center conductor in order to tune the resonator.

12 Claims, 7 Drawing figures

Full	Title	Chatter	Front	Review	Classification	Date	Reference	Claims	AMC	Draw D
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☐ 12. Document ID: US 5795849 A Relevance Rank: 95

L1: Entry 9 of 21

File: USPT

Aug 18, 1998

US-PAT-NO: 5795849

DOCUMENT-IDENTIFIER: US 5795849 A

TITLE: Bulk ceramic superconductor structures

DATE-ISSUED: August 18, 1998

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hickman; Paul L.	Mtn. View	CA	94039-1837	

APPL-NO: 08/477671 [PALM]

DATE FILED: June 7, 1995

## PARENT-CASE:

This is a divisional of application Ser. No. 08/049,628 filed on Apr. 19, 1993, now abandoned, which is a divisional of application Ser. No. 07/418,786, filed Oct. 3, 1989, now abandoned, which was a continuation of Ser. No. 07/136,008 filed Dec. 21, 1987, now abandoned.

INT-CL-ISSUED: [06] H01L 39/24

US-CL-ISSUED: 505/329; 505/234, 505/237, 505/238, 505/470, 505/725, 427/62

US-CL-CURRENT: 505/329; 257/E39.011, 257/E39.018, 427/62, 505/234, 505/237,

505/238, 505/470, 505/725

FIELD-OF-CLASSIFICATION-SEARCH: 505/234, 505/237, 505/238, 505/230, 505/329, 505/330, 505/470, 505/725, 427/62, 427/63

See application file for complete search history.

PRIOR-ART-DISCLOSED:

#### U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3251715</u>	May 1966	Miles et al.	117/212
<u>3352007</u>	November 1967	Charles	29/599
<u>3449092</u>	June 1969	Hammond	29/194
<u>3534459</u>	October 1970	Kudo et al.	29/194
<u>3593413</u>	July 1971	Kafka	29/599
<u>3625662</u>	December 1971	Roberts et al.	29/191.6
<u>4316785</u>	February 1982	Suzuki et al.	427/62
<u>4430662</u>	February 1984	Jillie, Jr. et al.	357/5
<u>4797510</u>	January 1989	Mihelich	174/94
<u>4826808</u>	May 1989	Yurek et al.	505/1
<u>4828931</u>	May 1989	Ogawa et al.	428/596
<u>4849288</u>	July 1989	Schmaderer et al.	428/366
<u>4861751</u>	August 1989	Tenhover	505/1
<u>4886776</u>	December 1989	Early et al.	505/1
<u>4908346</u>	March 1990	Strom et al.	505/1
<u>4918050</u>	April 1990	Dworsky	505/1
<u>4921833</u>	May 1990	Takano	505/1
<u>4952554</u>	August 1990	Jin et al.	505/1
<u>4954480</u>	September 1990	Imanaka et al.	505/1
<u>4975411</u>	December 1990	Danby et al.	505/1
<u>5041420</u>	August 1991	Nagesh et al.	505/1

#### OTHER PUBLICATIONS

Kishio, Kohji et al., "Effect of Residual Water on Superconductivity in (La.sub.1-x Sr.sub.x).sub.2 CuO.sub.4-.delta.," Japanese Journal of Applied Physics, vol. 26, No. 4, Apr. 1987, pp. L466-L467.

Chu, C.W. et al., "Evidence for Superconductivity above 40 K in the La-Ba-Cu-O Compound System," Physical Review Letters, vol. 58, No. 4, Jan. 26, 1987, pp. 405-407.

Uchida, Shin-ichi et al., "High T.sub.c Superconductivity of La-Ba-Cu Oxides," Japanese Journal of Applied Physics, vol. 26, No. 1, Jan. 1987, pp. L1-L2.

Koinuma, Hideomi et al., "High T.sub.c Superconductivity in Screen Printed Yb-Ba-Cu-O Films," Dept. of Industrial Chemistry, Apr. 25, 1987.

Cava, R.J. et al., "Bulk Superconductivity at 36 K in La.sub.1.8 Sr.sub.0.2 CuO.sub.4," Physical Review Letters, vol. 58, No. 4, Jan. 26, 1987.

Bednorz, J.G. et al., "Possible High T.sub.c Superconductivity in the Ba-La-Cu-o System," Condensed Matter 1986, pp. 189-193.

Koinuma, Hideomi et al., "Preparation of (La.sub.1-x Sr.sub.x).sub.2 CuO.sub.4-.delta. Superconducting Films by Screen Printing Method," Dept. of Industrial Chemistry, Mar. 23, 1987, pp. L399-L401.

- Saito, Yashitami et al., "Composition Dependence of the High Temperature Superconductivity in (Ba,Sr)-La-(Hg,Ag)-Cu-O System with K.sub.2 NiF.sub.4 -Type Structure," Japanese Journal of Applied Physics, vol. 26, No. 3, Mar. 1987, pp. L223-L224.
- Koinuma, Hideomi et al., "Some Problems in the Preparation of Superconducting Oxide Films on Ceramic Substrates," Japanese Journal of Applied Physics, vol. 26, No. 5, May 1987, pp. L763-L765.
- Nakajima, H. et al., "Interdiffusion and Interfacial Reaction Between a YBa.sub.2 Cu.sub.3 O.sub.x Thin Film and Substrates," App. Phys. Lett, Oct. 1988, pp. 1437-1439.
- Sun, J.Z. et al., "Superconductivity and Magnetism in the High-Tc Superconductor YBaCuO," Dept. of Applied Physics, Stanford University, pp. 1-7.
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- Saito, Yoshitami et al., "Superconductivity of Sr-La-Cu Oxides Prepared by Coprecipitation Method," Japanese Journal of Applied Physics, vol. 26, No. 5, May 1987, pp. L836-L837.
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- Capone II, D.W. et al., "Super Critical Fields and High Superconducting Transition Temperatures of La.sub.1.85 Sr.sub.0.15 CuO.sub.4 and La.sub.1.85 Ba.sub.0.15 CuO.sub.4 ", App. Phys. Lett, 50 (9) Mar. 2, 1987, pp. 543-544.
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- Johnson, D.W. et al., "Fabrication of Ceramic Articles from High T.sub.0 Superconducting Oxides," 1987 Advanced Ceramic Materials, vol. 2, No. 3B, pp. 364-371.
- "Cuprate Superconductors Record 133 K Achieved with Mercury," May 10, 1993 C&EN, pp. 4-5.
- Geballe, Theodore H., "Paths to Higher Temperature Superconductors," Science, Mar. 12, 1993, vol. 259, pp. 1550-1551.
- "Is the Train of the Future About To Pull In?" Science & Technology, Business Week, Nov. 16, 1987, pp. 150.

ART-UNIT: 112

PRIMARY-EXAMINER: King; Roy V.

ABSTRACT:

A method for producing a superconductor assembly includes preparing a first bulk ceramic superconductor having a first essentially random pattern of superconductor domains of a copper-oxide ceramic superconductor and non-superconductor domains at a critical temperature, and preparing a second bulk ceramic superconductor having a second essentially random pattern of superconductor domains of a copper-oxide ceramic superconductor and non-superconductor domains at the critical temperature. The method further includes juxtaposing a first surface of the first bulk ceramic superconductor proximate with a first surface of the second bulk ceramic superconductor to form a superconductor assembly where superconductor domains of the first bulk ceramic superconductor and superconductor domains of the second bulk

ceramic superconductor are only randomly aligned due to the different first essentially random pattern and second essentially random pattern. The bulk layers can be attached together by a number of techniques, including sintering, using an adhesive, or providing a conductive or non-conductive interlayer.

28 Claims, 4 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	WAC	Drawings
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☐ 13. Document ID: US 6021337 A Relevance Rank: 95

L1: Entry 8 of 21

File: USPT

Feb 1, 2000

US-PAT-NO: 6021337

DOCUMENT-IDENTIFIER: US 6021337 A

TITLE: Stripline resonator using high-temperature superconductor components

DATE-ISSUED: February 1, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Remillard; Stephen K.	Arlington Heights	IL		
Hodge; James D.	Lincolnwood	IL		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Illinois Superconductor Corporation	Mt. Prospect	IL			02	

APPL-NO: 08/654647 [PALM]

DATE FILED: May 29, 1996

INT-CL-ISSUED: [06] H01P 7/08

US-CL-ISSUED: 505/210; 505/700, 505/866, 333/99.005, 333/219, 333/238

US-CL-CURRENT: 505/210; 333/219, 333/238, 333/99S, 505/700, 505/866

FIELD-OF-CLASSIFICATION-SEARCH: 333/995, 333/238, 333/219, 333/246, 333/222, 505/210, 505/700, 505/701, 505/866

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4621203</u>	November 1986	Sweeny	
<u>4837536</u>	June 1989	Honjo	333/99S X
<u>4869598</u>	September 1989	McDonald	374/176

<u>4918050</u>	April 1990	Dworsky	
<u>4956335</u>	September 1990	Agostinelli et al.	
<u>5164358</u>	November 1992	Buck et al.	505/210 X
<u>5219827</u>	June 1993	Higaki et al.	505/210 X
<u>5289139</u>	February 1994	Fiedziuszko et al.	331/56
<u>5309119</u>	May 1994	Shiga	331/99
<u>5340797</u>	August 1994	Hodge et al.	505/780 X
<u>5373109</u>	December 1994	Argyarakis et al.	333/238 X
<u>5378949</u>	January 1995	Cummings et al.	327/113
<u>5391543</u>	February 1995	Higaki et al.	505/210
<u>5397769</u>	March 1995	Higaki et al.	333/235 X
<u>5418504</u>	May 1995	Nottenburg	333/238 X
<u>5621366</u>	April 1997	Gru et al.	333/219 X

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
435765	July 1991	EP	

## OTHER PUBLICATIONS

Apte et al., "Microwave Surface Resistance of high T.sub.c Superconducting Films", SPIE--The International Society for Optical Engineering, vol. 2559, pp. 92-104, Jul. 10, 1995.

Button et al., "The Processing and Properties of High T.sub.c Thick Films", University of Birmingham Superconductivity Research Group, Birmingham, B15 2TT, U.K., Sep. 24, 1990.

Chaloupka, H., "Theoretical and experimental characterization of nonlinear dynamic effects in epitaxial HTS microwave circuits and consequences to applications", Bergische Universitat Wuppertal, FR Germany, Oct. 1991.

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Liang et al., "High-Power HTS Microstrip Filters for Wireless Communication", IEEE Transactions on Microwave Theory and Techniques, 43(12):3020-3029 (1995).

Mannhart et al., "High-T.sub.c Thin Films. Growth Modes--Structure--Applications", Invited presentation at NATO ASI Course on "Materials and Crystallographic Aspects of High T.sub.c Superconductivity", Erice, Italy, May 17-29, 1993.

Mossavati et al., "Thick film YBCO microstrip resonators", Supercond. Sci. Technol., 4:S145-S147 (1991).

Oates et al., "Measurements and Modeling of Linear and Nonlinear Effects in Striplines", Published in Journal of Superconductivity, 5(4):361-369 (1992).

Oates et al., "Surface Impedance Measurements of YBa.sub.2 Cu.sub.3 O.sub.7-x Thin Films In Stripline Resonators", IEEE Transactions on Magnetics, 27(2):867-871 (1991).

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ART-UNIT: 287

PRIMARY-EXAMINER: Lee; Benny T.

ATTY-AGENT-FIRM: Marshall, O'Toole, Gerstein, Murray & Borun

#### ABSTRACT:

A stripline resonator has a center conductor between layers of dielectric which are, in turn, between ground planes. The center conductor is made of a high-temperature superconducting material, preferably having a total superconductor thickness from at least about one micron to at least about one-hundred microns. The superconducting material has an electromagnetic penetration depth and the ratio of

the thickness of the superconductor to the penetration depth is from at least about 4:1 to at least about 100:1. The center conductor may be formed of a substrate coated with the high-temperature superconducting material so that the center conductor is discrete from the dielectric element. The center conductor may have a length which is greater than the length of the dielectric element.

51 Claims, 3 Drawing figures

Full	Title	Chatter	Front	Review	Classification	Date	Reference		Claims	Kind	Draw D
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☐ 14. Document ID: US 6066598 A Relevance Rank: 95

L1: Entry 7 of 21

File: USPT

May 23, 2000

US-PAT-NO: 6066598

DOCUMENT-IDENTIFIER: US 6066598 A

TITLE: Superconducting multilayer electrode and method of producing same

DATE-ISSUED: May 23, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ishikawa; Yohei	Kyoto			JP
Hidaka; Seiji	Nagaokakyo			JP
Matsui; Norihumi	Kyoto			JP
Ise; Tomoyuki	Nagaokakyo			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Murata Manufacturing Co., Ltd.				JP		03

APPL-NO: 08/621651 [PALM]

DATE FILED: April 30, 1996

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
JP	7-068453	March 27, 1995

INT-CL-ISSUED: [07] H01P 3/08

US-CL-ISSUED: 505/210; 333/99S, 333/238

US-CL-CURRENT: 505/210; 257/E39.011, 333/238, 333/99S

FIELD-OF-CLASSIFICATION-SEARCH: 333/99S, 333/238, 333/246, 333/219, 505/210, 505/700, 505/701, 505/866

See application file for complete search history.

PRIOR-ART-DISCLOSED:



## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>2769148</u>	October 1956	Clogston	333/236
<u>2769150</u>	October 1956	Black et al.	333/243
<u>4918050</u>	April 1990	Dworsky	505/701 X

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
954528	December 1956	DE	505/701
5-085705	April 1993	JP	
9461566	March 1995	WO	

## OTHER PUBLICATIONS

Blennemann, H. et al; "Novl Microstructuse for Low Distortion Chip to Chip Interconnects"; SPIE, Int'l Conf on advances in Interconnetrons and packaging; vol. 1389, 1990; pp. 215-235.

ART-UNIT: 287

PRIMARY-EXAMINER: Lee; Benny T.

ATTY-AGENT-FIRM: Ostrolenk, Faber, Gerb & Soffen, LLP

## ABSTRACT:

A superconductor layer is formed on one side of a dielectric substrate, and with this superconductor layer as a conductor layer of the bottommost layer, superconductor layers and dielectric layers are alternately laminated with each other. Thus, a superconducting multilayer electrode is provided which is laminated with at least one TEM mode transmission line which is constituted of a pair of superconductor layers with a dielectric layer sandwiched in between, and the superconductor layer and the dielectric layer have film thicknesses which are set so that the maximum value of the current density flowing through each superconductor layer becomes the same. The resistance to electric power of the superconducting multilayer electrode is proportional to the number of laminated layers.

9 Claims, 29 Drawing figures

Full	Title	Cratn	Front	Review	Classification	Date	Reference	Claims	Draw

☐ 15. Document ID: US 6083883 A Relevance Rank: 95

L1: Entry 6 of 21

File: USPT

Jul 4, 2000

US-PAT-NO: 6083883

DOCUMENT-IDENTIFIER: US 6083883 A

TITLE: Method of forming a dielectric and superconductor resonant structure

DATE-ISSUED: July 4, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lithgow; Robert D.	Schaumburg	IL		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Illinois Superconductor Corporation	Mt. Prospect	IL			02	

APPL-NO: 08/638435 [PALM]

DATE FILED: April 26, 1996

INT-CL-ISSUED: [07] H01L 39/24, H01P 7/04

US-CL-ISSUED: 505/210; 505/238, 333/219.1, 333/222, 333/99S

US-CL-CURRENT: 505/210; 333/219.1, 333/222, 333/99S, 505/238

FIELD-OF-CLASSIFICATION-SEARCH: 333/219, 333/222, 333/99S, 505/210, 505/230, 505/238, 505/239, 505/701, 505/704, 505/866, 428/373, 428/376, 428/378, 428/392, 428/688, 428/689, 428/699, 428/701, 428/702, 428/930  
See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4318064</u>	March 1982	Kach	333/202
<u>4344052</u>	August 1982	Davidson	333/222
<u>4431977</u>	February 1984	Sokola et al.	333/206
<u>4441088</u>	April 1984	Anderson	333/1
<u>4463328</u>	July 1984	Doty	333/222
<u>4559504</u>	December 1985	Krec	337/194
<u>4879533</u>	November 1989	de Muro et al.	333/206
<u>4918050</u>	April 1990	Dworsky	505/1
<u>4996188</u>	February 1991	Kommrusch	505/1
<u>5055808</u>	October 1991	Walker et al.	333/207
<u>5172085</u>	December 1992	Glenat et al.	333/222
<u>5179074</u>	January 1993	Fiedziuszek et al.	505/1
<u>5210511</u>	May 1993	Izumi et al.	333/222
<u>5324713</u>	June 1994	Shen	505/210
<u>5340797</u>	August 1994	Hodge et al.	505/4.7
<u>5457087</u>	October 1995	Dorothy et al.	505/210
<u>5585331</u>	December 1996	Mansour et al.	505/210

## OTHER PUBLICATIONS

Alford et al., Surface Resistance of Bulk and Thick Film YBa.sub.2 CU.sub.3 O.sub.x, IEEE Transactions on Magnetics, vol. 27, No. 2, pp. 1510-1518, Mar. 1991.  
 Lancaster et al., "Superconducting microwave resonators," IEEE Proceedings-H, vol. 139, No. 2, pp. 149-156, Apr. 1992.

ART-UNIT: 172

PRIMARY-EXAMINER: King; Roy V.

ATTY-AGENT-FIRM: Marshall, O'Toole, Gerstein, Murray & Borun

## ABSTRACT:

A resonant structure has a center conductor, a dielectric element, and an outer conductor. The center conductor is a substrate with a coating of a superconductor on its outer surface, and the outer conductor is a substrate with a coating of a superconductor on its inner surface. The dielectric element has a passageway which is sized for receiving the inner conductor so that there is substantially complete contact between the layers of superconductor coating and the dielectric. Similarly, the outer surface of the dielectric element is sized to match the inner superconductor coated surface of the outer conductor.

8 Claims, 8 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWC	Draw.D.
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☐ 16. Document ID: US 6156707 A      Relevance Rank: 95

L1: Entry 5 of 21

File: USPT

Dec 5, 2000

US-PAT-NO: 6156707

DOCUMENT-IDENTIFIER: US 6156707 A

TITLE: Method of manufacturing superconducting microwave component substrate

DATE-ISSUED: December 5, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Matsuura; Takashi	Hyogo			JP
Higaki; Kenjiro	Hyogo			JP
Itozaki; Hideo	Hyogo			JP

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Sumitomo Electric Industries, Ltd.	Osaka			JP	03

APPL-NO: 08/383713      [PALM]

DATE FILED: February 3, 1995

PARENT-CASE:

This application is a continuation of application Ser. No. 08/253,602, filed Jun. 3, 1994, abandoned, which is a continuation of Ser. No. 07/885,871, filed May 20, 1992, abandoned.

INT-CL-ISSUED: [07] C23C 14/34

US-CL-ISSUED: 505/470; 505/475, 505/501, 204/192.24

US-CL-CURRENT: 505/470; 204/192.24, 505/475, 505/501

FIELD-OF-CLASSIFICATION-SEARCH: 204/192.24, 505/1, 505/866, 505/470, 505/475, 505/501

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4918050</u>	April 1990	Dworsky	505/866 X
<u>4962316</u>	October 1990	Jack	505/866 X
<u>4997813</u>	March 1991	Higaki et al.	204/192.24 X
<u>5077269</u>	December 1991	Sugihara et al.	204/192.24 X
<u>5114906</u>	May 1992	Higaki et al.	204/192.24 X
<u>5140004</u>	August 1992	Tanaka et al.	204/192.24 X

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0 435 765	March 1991	EP	

OTHER PUBLICATIONS

Hammond et al., "Epitaxial  $Tl_{0.2}Ca_{0.2}Cu_{0.2}O_{0.8}$  Thin films with Low 9.6 GHz Surface Resistance at High Power and Above 77 K", Applied Physics Letters, Aug. 20, 1990, vol. 57 No. 8, pp. 825-827

Tanaka, "High-Frequency Transmission through Bi-Sr-Ca-Cu-O Double-Sided Microstripline on a MgO Substrate", Japanese Journal of Applied Physics, Apr. 15, 1991 vol. 30, No. 4B, pp. L700-L702.

Withers, et al., -"High-Thdcl Superconducting Thin Films for Microwave Application", Solid State Technology, Aug. 1990, vol. 33 No. 8, pp. 83-87.

ART-UNIT: 173

PRIMARY-EXAMINER: Nguyen; Nam

ATTY-AGENT-FIRM: Foley & Lardner

ABSTRACT:

A substrate for a superconducting microwave component is composed of a pair of oxide superconductor thin films formed on opposite surfaces of a dielectric substrate, respectively. After Tl-type oxide superconducting thin films are deposited the opposite surfaces of the dielectric substrate, respectively, an annealing is performed in a thallium atmosphere:

6 Claims, 1 Drawing figures

Full	Title	Claims	Front	Review	Classification	Date	Reference	Claims	Keywords	Drawings
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☐ 17. Document ID: US 6366096 B1      Relevance Rank: 95

L1: Entry 4 of 21

File: USPT

Apr 2, 2002

US-PAT-NO: 6366096

DOCUMENT-IDENTIFIER: US 6366096 B1

TITLE: Apparatus and method for measuring of absolute values of penetration depth and surface resistance of metals and superconductors

DATE-ISSUED: April 2, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Talanov; Vladimir V.	Greenbelt	MD		
Anlage; Steven Mark	Laurel	MD		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
University of Maryland, College Park	Riverdale	MD			02

APPL-NO: 09/633252      [PALM]

DATE FILED: August 4, 2000

PARENT-CASE:

REFERENCE TO RELATED APPLICATION This Patent Application is based upon U.S. Provisional Application Ser. No. 60/147,705 provisional application has been expired, filed Aug. 6, 1999.

INT-CL-ISSUED: [07] G01R 27/00

US-CL-ISSUED: 324/633; 324/653, 324/662

US-CL-CURRENT: 324/633; 324/653, 324/662

FIELD-OF-CLASSIFICATION-SEARCH: 324/234, 324/236, 324/237, 324/633, 324/636, 324/71.6, 324/652, 324/653, 324/655, 324/662, 324/635

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>3745479</u>	July 1973	Okabe et al.	
<u>4918050</u>	April 1990	Dworsky	
<u>4959614</u>	September 1990	Bowling et al.	
<u>4968945</u>	November 1990	Woskov et al.	
<u>5239369</u>	August 1993	Suzuki	
<u>5268646</u>	December 1993	Doss	
<u>5420518</u>	May 1995	Schafer	324/653
<u>5496797</u>	March 1996	Higaki et al.	
<u>5506497</u>	April 1996	Klein et al.	
<u>5563505</u>	October 1996	Dorothy et al.	
<u>5710105</u>	January 1998	Shen	
<u>6025725</u>	February 2000	Gershenfeld et al.	324/652

ART-UNIT: 2858

PRIMARY-EXAMINER: Metjahic; Safet

ASSISTANT-EXAMINER: Nguyen; Vincent Q.

ATTY-AGENT-FIRM: Rosenberg, Klein &amp; Lee

## ABSTRACT:

An apparatus and method for accurately estimating the absolute value of surface resistances and penetration depths of metallic films and bulk samples. The apparatus carries out measurements using two nominally identical samples with flat sample surfaces which are brought together with a thin dielectric separation of variable thickness sandwiched between the samples in order to form a two-conductor parallel plate transmission line resonator which carries an electromagnetic wave. A liquid or gas of unknown dielectric properties fills the dielectric spacer. A resonant condition of the microwave signal is established and the resonant frequency and the quality factor  $Q$  are measured while the spacing between the sample plates is varied. The variation of the resonant frequency and  $Q$  with spacer thickness is then analyzed to yield absolute values of the sample surface resistance and penetration depth which are then further used for determination of absolute complex conductivity and surface impedance of the samples.

20 Claims, 6 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference		Claims	Notes	Drawings
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☐ 18. Document ID: US 6463308 B1      Relevance Rank: 95

L1: Entry 3 of 21

File: USPT

Oct 8, 2002

US-PAT-NO: 6463308

DOCUMENT-IDENTIFIER: US 6463308 B1

TITLE: Tunable high Tc superconductive microwave devices

DATE-ISSUED: October 8, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wikborg; Erland	Danderyd			SE
Vendik; Orest	S. Petersburg			RU
Kollberg; Erik	Lindome			SE
Gevorgian; Spartak	Goteborg			SE

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Telefonaktiebolaget LM Ericsson (publ)	Stockholm			SE		03

APPL-NO: 08/989166 [PALM]

DATE FILED: December 11, 1997

## PARENT-CASE:

This application is a continuation of International Application No. PCT/SE96/00768, filed Jun. 13, 1996, which designates the United States.

## FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
SE	9502137	June 13, 1995

INT-CL-ISSUED: [07] H01P 7/08, H01P 1/203, H01B 12/02

US-CL-ISSUED: 505/210; 333/219, 333/202, 333/99.005

US-CL-CURRENT: 505/210; 333/202, 333/219, 333/99S

FIELD-OF-CLASSIFICATION-SEARCH: 333/995, 333/219, 333/202, 333/205, 333/204, 505/210, 505/700, 505/701, 505/866

See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4918050</u>	April 1990	Dworsky	333/995
<u>5132282</u>	July 1992	Newman et al.	505/701
<u>5179074</u>	January 1993	Fiedziuszko et al.	333/995
<u>5208213</u>	May 1993	Ruby	505/701
<u>5219827</u>	June 1993	Higaki et al.	333/995
<u>5391543</u>	March 1995	Higaki et al.	333/995
<u>5397769</u>	March 1995	Higaki et al.	333/995
<u>5538941</u>	July 1996	Findikoglu et al.	333/995

5786303

July 1998

Mansour

333/995

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
496 512	July 1992	EP	333/204
17701	January 1990	JP	
WO94/13028	June 1994	WO	
WO94/28592	December 1994	WO	
WO96/42117	December 1996	WO	
WO87/00350	December 1997	WO	

## OTHER PUBLICATIONS

Jackson C.M. et al; "Novel Monolithic Phase Shifter Combining Feroelectrics and High Temperature Superconductors"; Microwave and Optical Tech Letters; vol. 5, No. 14; Dec. 1992, pp. 722-726.\*

Galt, D. et al., "Characterization of a Tunable Thin Film Microwave YBCO-x/STO Coplanar Capacitor", American Institute of Physics, vol. 63, No. 22, pp. 3078-3080, Nov. 1993.

Vendik, O.G. et al., "1 GHz Tunable Resonator on Bulk Single Crystal SrTiO3 Plated with YBa2Cu3O7-x Films", Electronics Letters, vol. 31, No. 8, Apr. 1995.

Abbas, F. et al., "Tunable Mcrowave Components Based on Dielectric Non Linearity by Using HTS-Ferreelectric Thin Films", IEEE Transactions on Applied Superconductivity, vol. 5, No. 4, pp. 3511-3517, Dec. 1995.

Findikoglu, A.T. et al., "Electrical Characteristics of Coplanar Waveguide Devices Incorporating Nonlinear Dielectric Thin Films of SrTiO3 and Sr0.5Ba0.5TiO3," Microwave and Optical Technology Letters, vol. 9, No. 6, pp. 306-310, Aug. 1995.

Shen, Z-Y, High Temperature Superconducting Microwave Circuits, Artech House, 1994.

Sheen, D.M. et al., "Current Distribution, Resistance and Inductance for Superconducting Strip Transmission Lines", IEEE Transactions on Applied Superconductivity, vol. 1, No. 2, Jun. 1991.

Krupka, et al., "Dielectric Properties of Single Cystals of Al<sub>0.2</sub>O<sub>0.3</sub>, LaAlO<sub>0.3</sub>, NdGaO<sub>0.3</sub>, SrTiO<sub>0.3</sub>, and MgO at Cryogenic Temperatures", IEEE MTT, vol. 42, No. 10, p. 1886, 1994.

Jackson, C.M. et al., "A High Temperature Superconducting Phase Shifter", Microwave Journal, vol. 5, No. 4, pp. 72-78, Dec. 1992.

ART-UNIT: 2817

PRIMARY-EXAMINER: Lee; Benny T.

ATTY-AGENT-FIRM: Burns, Doane, Swecker & Mathis, L.L.P.

## ABSTRACT:

A tunable microwave device has a substrate of a dielectric material which has a variable dielectric constant. At least one superconducting film is arranged on at least parts of the dielectric substrate. The dielectric substrate includes a non-linear dielectric bulk material.

28 Claims, 18 Drawing figures



Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	AMC	Drawings
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☐ 19. Document ID: US 6593833 B2      Relevance Rank: 95

L1: Entry 2 of 21

File: USPT

Jul 15, 2003

US-PAT-NO: 6593833

DOCUMENT-IDENTIFIER: US 6593833 B2

TITLE: Tunable microwave components utilizing ferroelectric and ferromagnetic composite dielectrics and methods for making same

DATE-ISSUED: July 15, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Joines; William T.	Durham	NC		
Palmer; William D.	Durham	NC		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
MCNC	Research Triangle Park	NC			02

APPL-NO: 09/826548      [PALM]

DATE FILED: April 4, 2001

INT-CL-ISSUED: [07] H01P 3/08

US-CL-ISSUED: 333/238; 333/99.005

US-CL-CURRENT: 333/238

FIELD-OF-CLASSIFICATION-SEARCH: 333/995, 333/238, 505/210, 505/238, 505/239, 505/700

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4141080</u>	February 1979	Paul et al.	
<u>4244722</u>	January 1981	Tsuya et al.	
<u>4480254</u>	October 1984	Spencer et al.	
<u>4554519</u>	November 1985	Adam	
<u>4853660</u>	August 1989	Schloemann	
<u>4918050</u>	April 1990	Dworsky	333/995
<u>5162977</u>	November 1992	Paurus et al.	
<u>5312790</u>	May 1994	Sengupta et al.	

<u>5568106</u>	October 1996	Fang et al.	
<u>5587943</u>	December 1996	Torok et al.	
<u>5589845</u>	December 1996	Yandrofski et al.	
<u>5607631</u>	March 1997	Wolfson et al.	
<u>5640042</u>	June 1997	Koscica et al.	
<u>5721194</u>	February 1998	Yandrofski et al.	
<u>5830591</u>	November 1998	Sengupta et al.	
<u>5870274</u>	February 1999	Lucas	
<u>5912472</u>	June 1999	Voigtlaender et al.	
<u>5912486</u>	June 1999	Summerfelt	
<u>5925455</u>	July 1999	Bruzzzone et al.	
<u>5926073</u>	July 1999	Hasegawa et al.	
<u>5930165</u>	July 1999	Johnson et al.	
<u>6097271</u>	August 2000	Kozakoff	333/238

ART-UNIT: 2817

PRIMARY-EXAMINER: Lee; Benny

ATTY-AGENT-FIRM: Alston &amp; Bird LLP

## ABSTRACT:

A passive microwave component with constant impedance and electrically adjustable phase length utilizes a microstrip or stripline transmission line geometry incorporating a composite dielectric having both ferroelectric (FE) and ferromagnetic (FM) properties. These properties can be varied with externally applied electric and magnetic fields such that the phase length (or electrical length) of the line can be varied without varying the characteristic impedance of the transmission line. Thus, the component can be electrically tuned without adversely affecting the impedance match. The component can be used in microwave devices such as phase shifters, frequency filters, directional couplers, power dividers and combiners, and impedance-matching networks.

16 Claims, 6 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KMC	Draw D
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☐ 20. Document ID: US 6894584 B2      Relevance Rank: 95

L1: Entry 1 of 21

File: USPT

May 17, 2005

US-PAT-NO: 6894584

DOCUMENT-IDENTIFIER: US 6894584 B2

TITLE: Thin film resonators

DATE-ISSUED: May 17, 2005

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yi; Huai Ren	Schaumburg	IL		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Isco International, Inc.	Mount Prospect	IL			02

APPL-NO: 10/217273 [PALM]

DATE FILED: August 12, 2002

INT-CL-ISSUED: [07] H01P 7/00, H01B 12/02

US-CL-ISSUED: 333/99S; 505/210

US-CL-CURRENT: 333/99S; 505/210

FIELD-OF-CLASSIFICATION-SEARCH: 333/99S, 333/202, 333/222, 333/185, 333/219, 333/99, 333/1, 333/206, 333/187, 333/204, 333/207, 333/231, 333/224, 333/225, 324/248, 324/318, 324/316, 505/210, 505/430, 505/470, 505/451, 505/452  
See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>2752494</u>	June 1956	Finke et al.	331/101
<u>3246266</u>	April 1966	Racy	333/231
<u>3760482</u>	September 1973	Kawamura	29/896.22
<u>3872413</u>	March 1975	Schneider	333/224
<u>4207548</u>	June 1980	Graham et al.	333/225
<u>4318064</u>	March 1982	Kach	333/202
<u>4344052</u>	August 1982	Davidson	333/222
<u>4431977</u>	February 1984	Sokola et al.	333/206
<u>4441088</u>	April 1984	Anderson	333/1
<u>4446429</u>	May 1984	Francisz et al.	324/316
<u>4463328</u>	July 1984	Doty	333/222
<u>4504788</u>	March 1985	Francisz et al.	324/316
<u>4559504</u>	December 1985	Krec	337/194
<u>4728779</u>	March 1988	Kotani et al.	219/517
<u>4742320</u>	May 1988	Pfizenmaier et al.	333/219
<u>4812791</u>	March 1989	Makimoto et al.	333/219
<u>4841249</u>	June 1989	Duerr et al.	324/318
<u>4879533</u>	November 1989	de Muro et al.	333/206
<u>4918050</u>	April 1990	Dworsky	505/210
<u>4996188</u>	February 1991	Kommrusch	505/210
<u>5011823</u>	April 1991	Jin et al.	505/452
<u>5051704</u>	September 1991	Chapman et al.	330/52
<u>5055808</u>	October 1991	Walker et al.	333/207

<u>5157017</u>	October 1992	Jin et al.	505/451
<u>5172085</u>	December 1992	Glenat et al.	333/222
<u>5179074</u>	January 1993	Fiedziuszek et al.	505/430
<u>5210511</u>	May 1993	Izumi et al.	333/222
<u>5272132</u>	December 1993	Gyorgy et al.	505/210
<u>5304968</u>	April 1994	Ohtonen et al.	333/222
<u>5324713</u>	June 1994	Shen	505/210
<u>5340797</u>	August 1994	Hodge et al.	505/470
<u>5409889</u>	April 1995	Das	505/210
<u>5434547</u>	July 1995	Kaida et al.	333/187
<u>5457087</u>	October 1995	Dorothy et al.	505/210
<u>5585331</u>	December 1996	Mansour et al.	505/210
<u>5594342</u>	January 1997	Brey et al.	324/322
<u>5616540</u>	April 1997	Lithgow et al.	505/210
<u>5623238</u>	April 1997	Takahashi et al.	333/204
<u>5629266</u>	May 1997	Lithgow et al.	505/210
<u>5682128</u>	October 1997	Huang	335/216
<u>5703546</u>	December 1997	Takahashi et al.	333/204
<u>5710105</u>	January 1998	Shen	505/210
<u>5914296</u>	June 1999	Shen	505/210
<u>6060882</u>	May 2000	Doty	324/318
<u>6083883</u>	July 2000	Lithgow	505/210
<u>6108569</u>	August 2000	Shen	505/210
<u>6175237</u>	January 2001	Doty et al.	324/318
<u>6300760</u>	October 2001	Schubert et al.	324/248

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
2123823	November 1971	DE	
0 082 767	June 1983	EP	
WO88/08622	November 1988	WO	

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ART-UNIT: 2819

PRIMARY-EXAMINER: Wamsley; Patrick

ATTY-AGENT-FIRM: Marshall, Gerstein & Borun LLP

ABSTRACT:

A thin film resonator which combines a microstrip resonator structure and a coplanar resonator structure to form an integrated resonator structure. The resonant frequency of this resonator structure is independent of the substrate thickness within a certain thickness range. This resonator structure also has a very economical size, as compared to other existing resonator designs. Different coupling configurations between the resonators are shown with the resulting coupling coefficients. Also a two-pole, four-pole and an eight-pole filter are designed using the thin film resonator and the insertion loss and return loss characteristics for various filters are shown.

17 Claims, 17 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	PMC	Unsub D.
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☐ 21. Document ID: EP 570144 A1, AU 661388 B, AU 9337167 A, CA 2095364 A, FI 90808 B, JP 06037521 A, US 5408206 A      Relevance Rank: 91

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Nov 18, 1993

DERWENT-ACC-NO: 1993-361352

DERWENT-WEEK: 199346

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TITLE: Transmission line resonator of quarter or half wavelength - comprises two ceramic pieces with aligned groove, and strip coated with electrically conductive material connected to ground plane

INVENTOR: JANTUNEN, H; TURUNEN, A

PATENT-ASSIGNEE: LK PROD OY (LKLKN)

PRIORITY-DATA: 1992FI-0002102 (May 8, 1992)

## PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
<u>EP 570144 A1</u>	November 18, 1993	E	007	H01P001/203
<u>AU 661388 B</u>	July 20, 1995		000	H01P007/10
<u>AU 9337167 A</u>	November 11, 1993		000	H01P007/10
<u>CA 2095364 A</u>	November 9, 1993		000	H01P007/08
<u>FI 90808 B</u>	December 15, 1993		000	H01P007/08
<u>JP 06037521 A</u>	February 10, 1994		000	H01P007/08
<u>US 5408206 A</u>	April 18, 1995		008	H01P001/203

DESIGNATED-STATES: CH DE DK FR GB IT LI SE

CITED-DOCUMENTS: 04Jnl.Ref; JP 61201501 ; JP 62194702 ; US 4918050

## APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
EP 570144A1	May 4, 1993	1993EP-0303460	
AU 661388B	April 27, 1993	1993AU-0037167	
AU 661388B		AU 9337167	
AU 9337167A	April 27, 1993	1993AU-0037167	
CA 2095364A	April 22, 1993	1993CA-2095364	
FI 90808B	May 8, 1992	1992FI-0002102	
FI 90808B		FI 9202102	
JP 06037521A	May 10, 1993	1993JP-0108173	
US 5408206A	May 6, 1993	1993US-0058525	

INT-CL (IPC): H01P 1/203; H01P 7/08; H01P 7/10

ABSTRACTED-PUB-NO: EP 570144A

## BASIC-ABSTRACT:

The resonator is composed of two dielectric pieces (1,2). A groove (7) is formed on the upper surface of one piece, extending across the entire surface and is coated with an electrically conductive agent for e.g. silver-copper blend. The coating is also applied to the edge of the piece to act as a ground plane. Electrical connection is maintained between the ground plane and the groove coating to form a transmission line resonator.

A conductive strip is formed on the upper surface of the second piece running in the middle of the surface to form a transmission line resonator. The two pieces are placed together so that the groove and strip are parallel and adjacent to each other so that together they form a resonator.

USE/ADVANTAGE - For filter devices. Combines relatively simple tunability of microstrip resonators with higher Q factor obtainable from grooved stripline resonators.

ABSTRACTED-PUB-NO: US 5408206A

## EQUIVALENT-ABSTRACTS:

The high-frequency filter comprises a first and a second piece of dielectric material, the pieces being at least in part encapsulated by an electrically conductive layer serving as an earth plane. The first piece has an upper surface

with a groove extending across the entire surface. The groove having an electrically conductive material coating that is confined to the groove and is connected, at least at one end, with the electrically conductive layer. The coating forms a transmission line resonator, the upper surface of the second piece having a planar conductive strip extending in a middle of the surface.

The strip forms a transmission line resonator, the pieces being positioned with their upper surfaces facing each other and so attached to each other that the groove and the strip are positioned in parallel and facing one another.

One end of the groove is provided with a narrow uncoated area between the coating of the groove and the electrically conductive layer of a side face of the first piece.

USE - Transmission line resonator.

CHOSEN-DRAWING: Dwg.2/4 Dwg.2/6

DERWENT-CLASS: W02

EPI-CODES: W02-A03A5;

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KMC	Draw D.
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Term	Documents
"4918050"	21
4918050S	0
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